



ModbusTCP

## Gas Analyser for maritime emission monitoring BA 3 MA

Greenhouse gases and pollutants emitted into the atmospheres makes maritime a key contributor to worldwide emissions. Particularly CO<sub>2</sub> and SO<sub>2</sub> are responsible for ocean acidification, thus destroying this habitat. The BA 3 MA gas analyser is developed specifically for measuring these two components in the extreme environmental conditions of **maritime applications**.

The BA 3 MA is **DNV certified** (Statement of Compliance) as per regulation **MEPC 259(68)** and is therefore particularly optimised for monitoring emissions of maritime pollutant emission control system (SO<sub>2</sub> scrubbers). SO<sub>2</sub> traces are measured by NDUV spectroscopy, which is particularly insusceptible to interfering gas. Along with the vibration-protected mounting of the gas sensors therefore makes the device optimal for measuring minimal SO<sub>2</sub> traces.

The standard pressure compensation and thermostatisation of the gas sensors ensure high signal stability, even in highly fluctuating ambient temperatures. In addition to the SO<sub>2</sub> and CO<sub>2</sub> gas concentrations, this also shows the important SO<sub>2</sub>/CO<sub>2</sub> quotient in the display and is output via **4 - 20 mA**- and **Modbus TCP output signals**.

MEPC 259(68) certified for measuring maritime emissions

EMC and vibration-protected sensors

Safe for use in ambient temperatures between 5 °C and 45 °C

Smallest measuring range SO<sub>2</sub>: 0 - 100 ppm, NDUV

Smallest measuring range CO<sub>2</sub>: 0 - 10 Vol.%, NDIR

SO<sub>2</sub>/CO<sub>2</sub> quotient display and output [ppm/Vol.-%]

Modbus TCP and 4 – 20 mA output signals

Low T-Drift due to heated gas sensors

Pressure-compensated SO<sub>2</sub> and CO<sub>2</sub> measurement values

User-friendly touch screen with intuitive menu navigation

Optional: Internal sample gas pump and flow meter

Optional: Internal solenoid valves



## Technical Data

## General

Housing	Dimensions:	19" rack mount housing, 3 HE
	H x W x D:	132 x 440 x 425 mm
	Protection class:	IP 20
	Weight:	max. 10 kg
	Display and control:	4.7" touchscreen display
Electric supply	Voltage:	230 V AC or 115 V AC (note nameplate on the unit)
	Mains frequency:	50/60 Hz
	max. power input:	< 150 W
Ambient parameters	Ambient temperature:	5 °C ... 45 °C
	Relative humidity:	< 75 %
	Ambient pressure:	875 mbar to 1200 mbar
	Transport and storage temperature:	5 °C - 65 °C
AUTO cal. Function	Optional: Zero gas + span gas	
Warm up time	At least 30 min (up to 3 h recommended for high-precision SO <sub>2</sub> measurements in the lower ppm range)	

## Sample gas connections

Gas paths	One gas path (with auto cal. function)	
	Screw-in connection:	6 mm PVDF for 4/6 tube
Inlet parameters	Gas inlet temperature:	5 °C to 50 °C
	Sample gas pressure (absolute):	875 mbar to max. 1800 mbar, reduced to max. 1200 mbar with internal pump
	Sample gas conditioning:	purified/ filtered (< 10 µm filtration) sample gas with dew point < 10 °C (always 5 K below ambient temperature).

## Signal inputs and outputs

Analog output:	4 - 20 mA per channel
Limit relay:	2x per measuring channel (125 V AC, 0.5 A/30 V DC, 1 A)
Status relay:	Error, service, calibration, measuring range (125 V AC, 0.5 A/30 V DC, 1 A)
Binary inlets:	1x per channel + 1x per device
24 Volt output:	1x per channel (to supply binary inputs)
Digital interface:	Modbus TCP

## Parts in contact with sample gas

Component	Materials in contact with media	
Pump:	PET, PPS	
Flow regulator:	PTFE, stainless steel (1.4571)	
Gas lines:	FPM (Viton), stainless steel (1.4571)	
Solenoid valves:	PVDF or stainless steel (1.4571)	
Gas ducts:	PVDF or stainless steel (1.4571)	
Flow meter:	PVDF, borosilicate glass	
Measuring cell:	NDUV (SO <sub>2</sub> )	NDIR (CO <sub>2</sub> )
	Stainless steel (SU316), quartz glass, FKM, PTFE, CaF <sub>2</sub> glass, Nylon 66 GF30 %	

## Measuring cells

Measuring cell	NDUV (SO <sub>2</sub> )*	NDIR (CO <sub>2</sub> )*
Largest measuring range (MR)**:	0 - 500 vpm	0 - 15 Vol.%
Smallest measuring range (MR)**:	0 - 100 vpm	0 - 10 Vol.%
Response time t <sub>90</sub> :	< 12 sec	< 15 sec
Linearity deviation:	< 2 % MW or 0.3 % FS (depending on greater value)	< 2 % MW or 0.3 % FS (depending on greater value)
Zero point long-term stability:	< 2 ppm/day or < 1 % FS/day (depending on greater value)	< 1 % FS/day
Span long-term stability:	< 2 % FS/week	< 1 % FS /week
Repeatability:	< 1 % FS	< 1 % FS
Detection limit (2.5σ***):	< 0.3 % FS	< 0.3 % FS
Temperature drift:	< 1 % FS/10K	< 1 % FS/10K
Thermostatization:	Yes	Yes

\* Measurement performance in accordance with IMO regulation MEPC 259(68)

\*\* Measuring ranges configurable between max. and min.

\*\*\* σ = standard deviation at zero point

## Abbreviations:

FS = Full Scale (upper range value)

MW = measurement value

## Options for integration

Options currently available:

- Built-in pump
- Gas analysis filter
- Float Flow Meter
- Internal auto-calibration 3/2 way solenoid valve (internal switchover between test gas and process gas)

## Gas connections

- Pipe fitting (Ø6 mm)
- PVDF hose screw connections (Ø4/6 mm)

## Equipment overview

